

**Features**

- ESD protected up to 2KV(HBM)
- Very Low FOM  $R_{DS(on)} \times Q_g$
- Halogen Free. "Green" Device (Note 1)
- Epoxy Meets UL 94 V-0 Flammability Rating
- Lead Free Finish/RoHS Compliant ("P" Suffix Designates RoHS Compliant. See Ordering Information)

**Maximum Ratings**

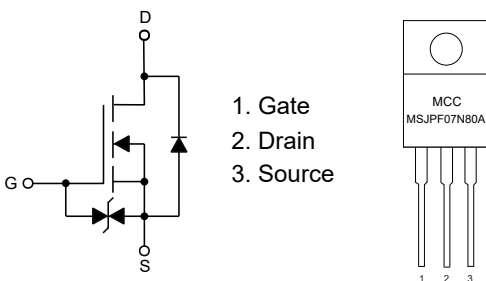
- Operating Junction Temperature Range : -55°C to +150°C
- Storage Temperature Range: -55°C to +150°C
- Thermal Resistance: 40°C/W Junction to Ambient (Note 2)
- Thermal Resistance: 1.6°C/W Junction to Case

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	$V_{DS}$	800	V
Gate-Source Voltage	$V_{GS}$	±20	V
Continuous Drain Current	$I_D$	$T_C=25^\circ C$	7
		$T_C=100^\circ C$	4.4
Pulsed Drain Current (Note 3)	$I_{DM}$	28	A
Total Power Dissipation (Note 4)	$P_D$	78	W
Single Pulsed Avalanche Energy (Note 5)	$E_{AS}$	32	mJ

Note:

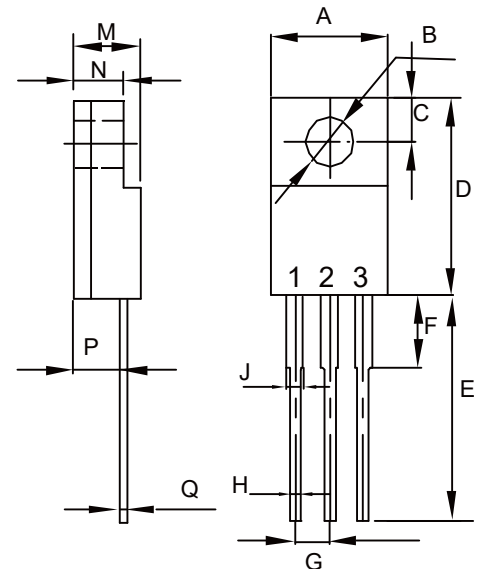
1. Halogen free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
2. The value of  $R_{\theta JA}$  is measured with the device mounted on 1in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with  $T_A=25^\circ C$ . The Power dissipation  $P_{DSM}$  is based on  $R_{\theta JA} \leq 10s$  and the maximum allowed junction temperature of 150°C. The value in any given application depends on the user's specific board design.
3. Repetitive rating; pulse width limited by max. junction temperature.
4.  $P_d$  is based on max. junction temperature, using junction-case thermal resistance.
5.  $V_{DD}=700V$ ,  $V_{GS}=10V$ ,  $L=20mH$ .

**Internal Structure and Marking Code**



**N-CHANNEL MOSFET**

**TO-220F**



DIM	DIMENSIONS				NOTE
	INCHES		MM		
	MIN	MAX	MIN	MAX	
A	0.392	0.421	9.96	10.70	
B	0.138		3.50		Φ
C	0.106		2.70		TYP.
D	0.567	0.642	14.40	16.30	
E	0.520		13.20		TYP.
F	---	0.177	---	4.50	
G	0.100		2.54		TYP.
H	0.020	0.035	0.50	0.90	
J	0.043	0.053	1.10	1.35	
M	0.169	0.201	4.30	5.10	
N	---	0.140	---	3.56	
P	0.083	0.126	2.10	3.20	
Q	0.020	0.032	0.50	0.80	

**Electrical Characteristics @ 25°C (Unless Otherwise Specified)**

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
<b>Static Characteristics</b>						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=250\mu A$	800			V
Gate-Source Leakage Current	$I_{GSS}$	$V_{DS}=0V, V_{GS}=\pm 20V$			$\pm 10$	$\mu A$
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=800V, V_{GS}=0V$			1	$\mu A$
Gate-Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2.5	3.6	4.5	V
Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=4A$		750	950	m $\Omega$
Gate Resistance	$R_G$	f = 1.0MHz, Open Drain		25		$\Omega$
<b>Diode Characteristics</b>						
Continuous Body Diode Current	$I_S$				7	A
Diode Forward Voltage	$V_{SD}$	$V_{GS}=0V, I_S=7A$			1.4	V
Reverse Recovery Time	$t_{rr}$	$I_F=3A, di_F/dt=100A/\mu s$		262		ns
Reverse Recovery Charge	$Q_{rr}$			2175		nC
<b>Dynamic Characteristics</b>						
Input Capacitance	$C_{iss}$	$V_{DS}=25V, V_{GS}=10V, f=1MHz$		502		pF
Output Capacitance	$C_{oss}$			678		
Reverse Transfer Capacitance	$C_{rss}$			21		
Total Gate Charge	$Q_g$	$V_{DS}=400V, V_{GS}=10V, I_D=3A$		14		nC
Gate-Source Charge	$Q_{gs}$			3.7		
Gate-Drain Charge	$Q_{gd}$			5.3		
Turn-On Delay Time	$t_{d(on)}$	$V_{DS}=400V, V_{GS}=10V, R_G=2.5\Omega, I_{DS}=3A$		12		ns
Turn-On Rise Time	$t_r$			27		
Turn-Off Delay Time	$t_{d(off)}$			70		
Turn-Off Fall Time	$t_f$			28.5		

**Curve Characteristics**

Fig. 1 - Typical Output Characteristics

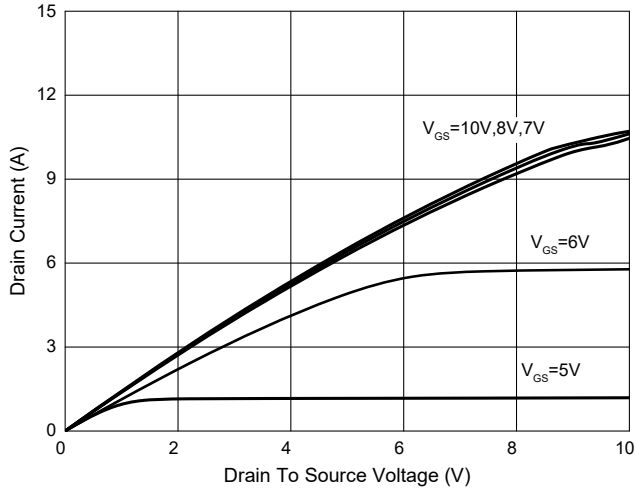


Fig. 2 - Transfer Characteristics

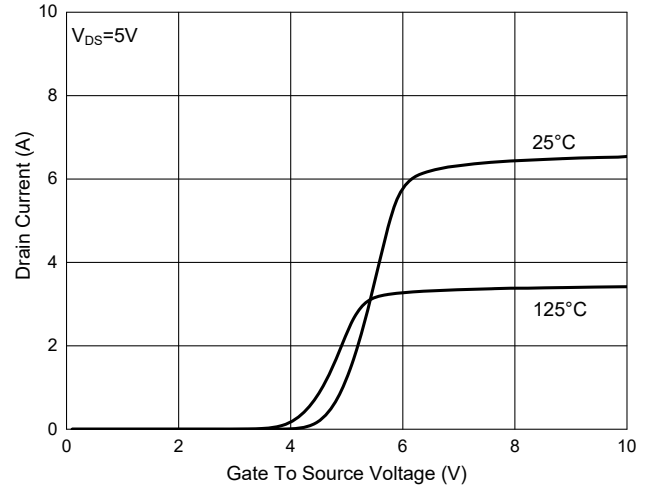


Fig. 3 -  $R_{DS(ON)} - V_{GS}$

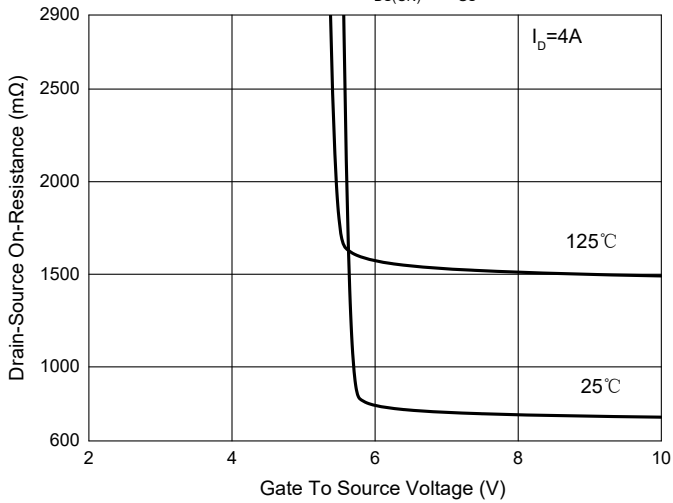


Fig. 4 -  $R_{DS(ON)} - I_D$

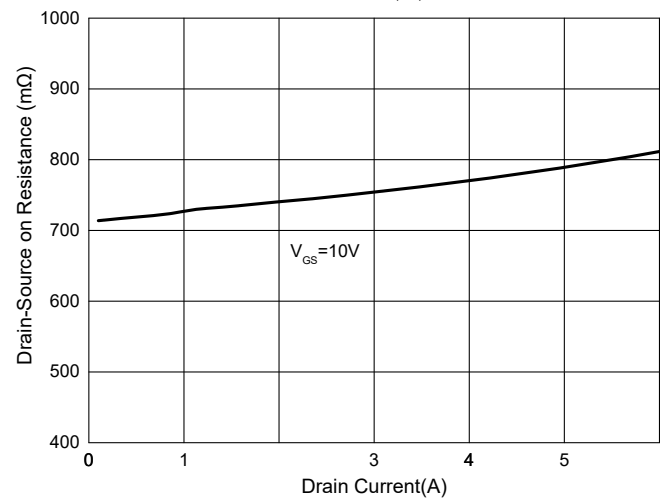


Fig. 5 - Capacitance Characteristics

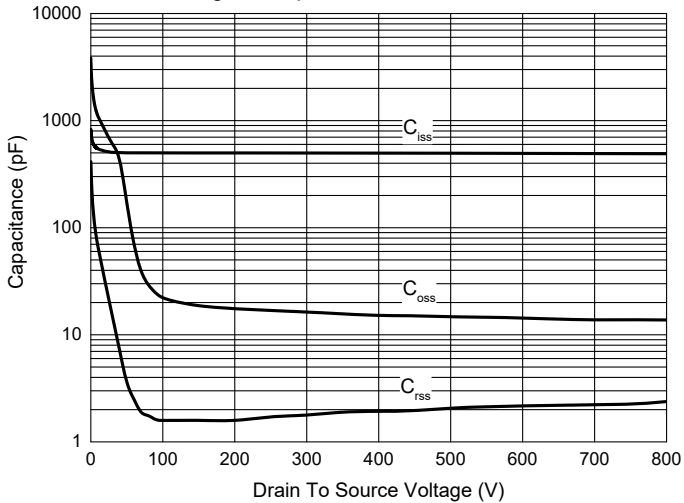
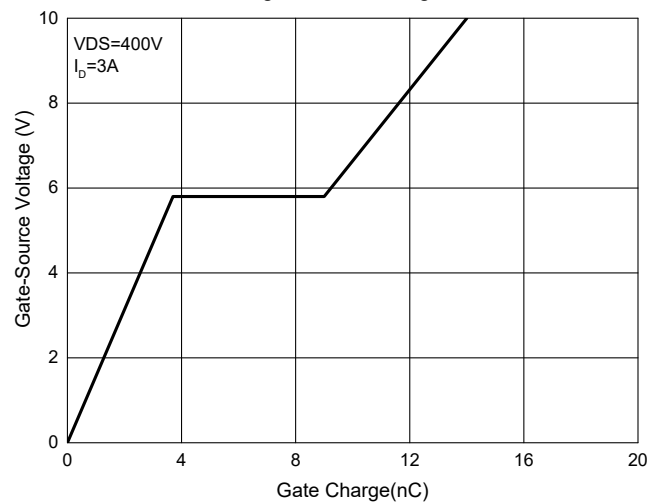


Fig. 6 - Gate Charge



**Curve Characteristics**

Fig. 7 - Normalized Threshold voltage

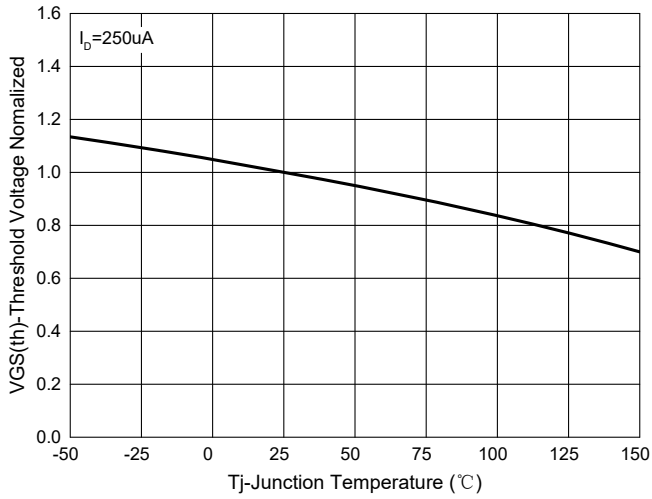


Fig. 8 - Normalized On Resistance Characteristics

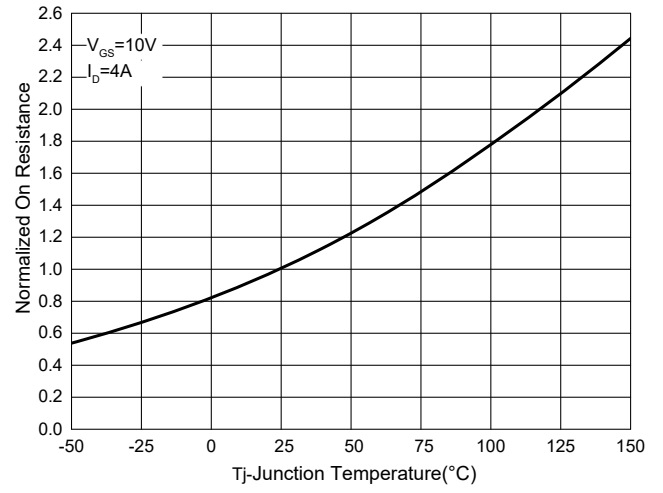


Fig. 9 -  $I_s - V_{SD}$

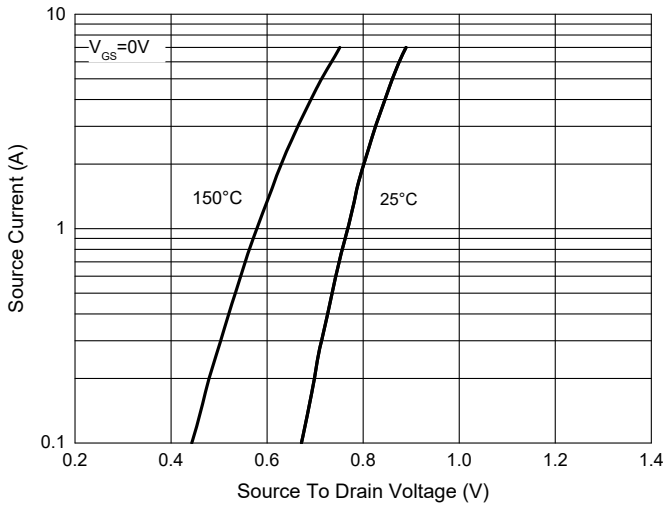


Fig. 10 - Drain Current

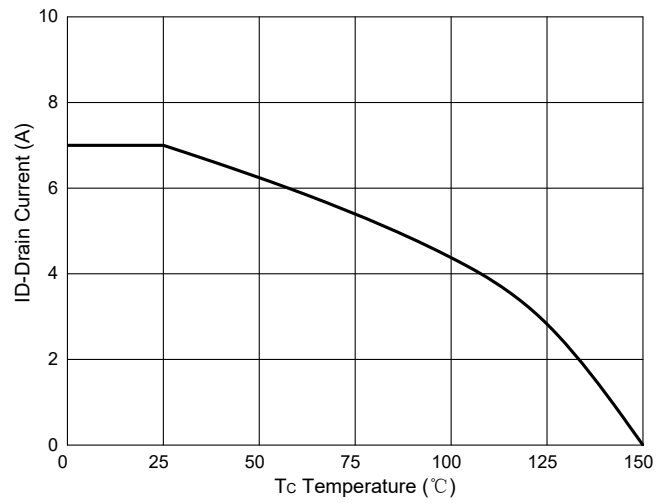
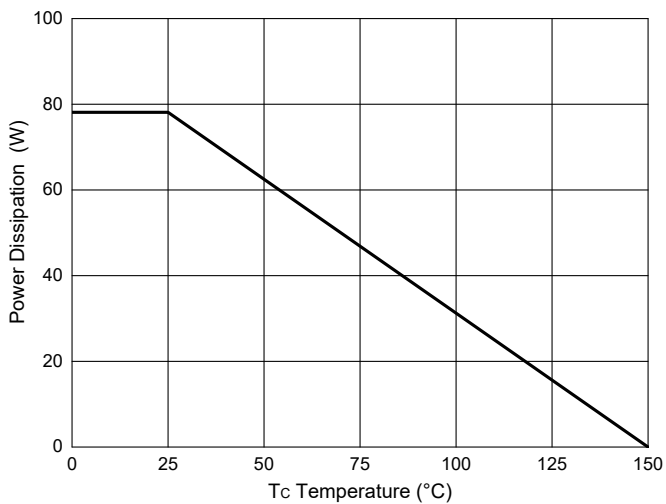


Fig. 11-PD Dissipation



**Curve Characteristics**

Fig. 12 - Safe Operation Area

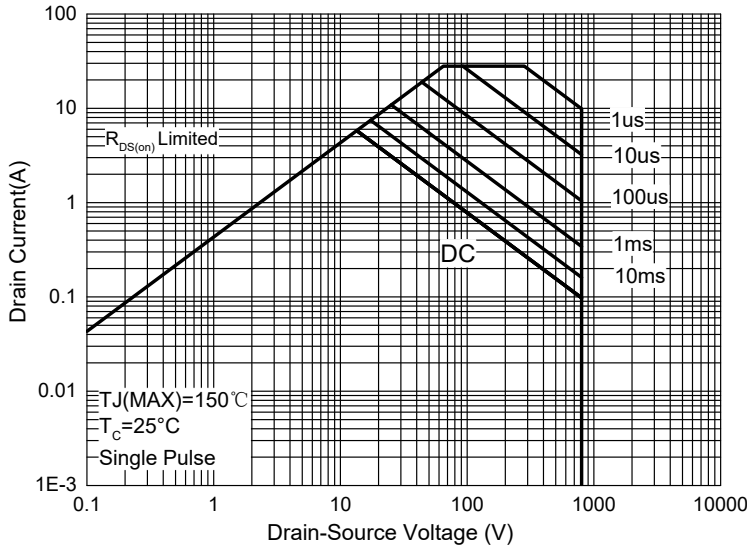
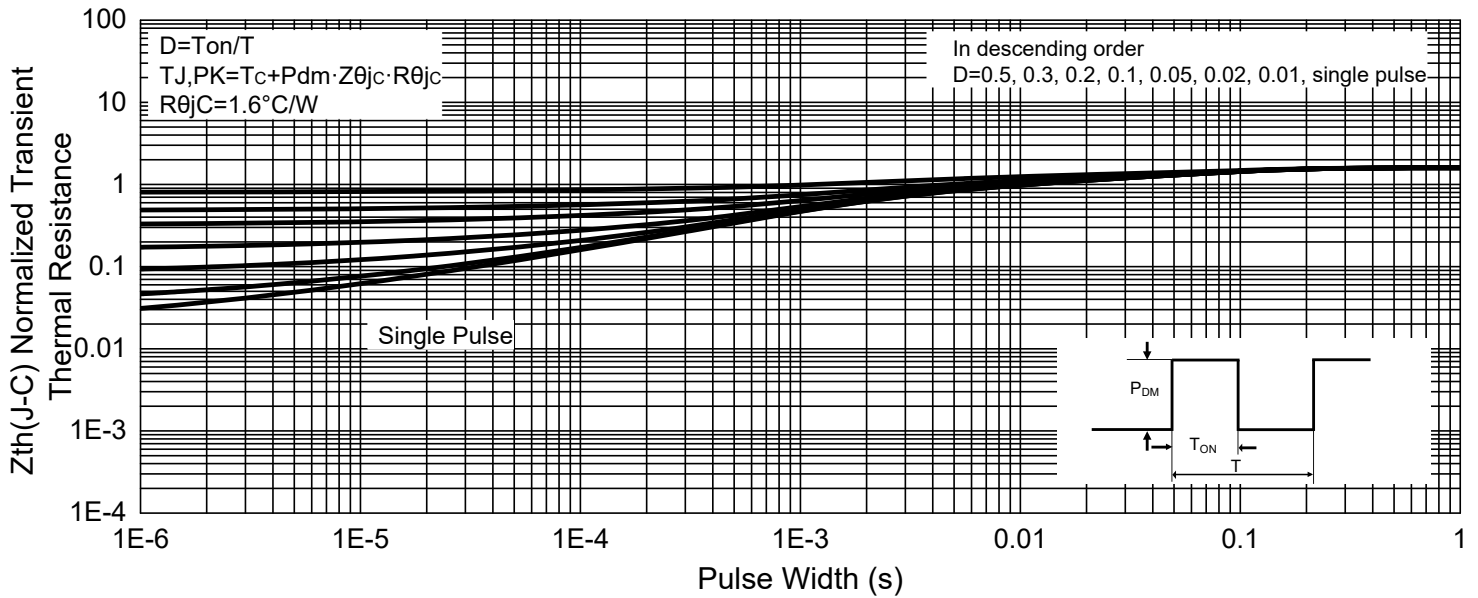


Fig. 13 -Normalized Transient Thermal Impedance



## Ordering Information

Device	Packing
Part Number-BP	Bulk: 50pcs/Tube; 1Kpcs/Box; 5Kpcs/Ctn

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